TRANSLATION NO. 3165

DATE: 22 March 1968

DEPARTMENT OF THE ARMY
Fort Detrick
Frederick, Maryland

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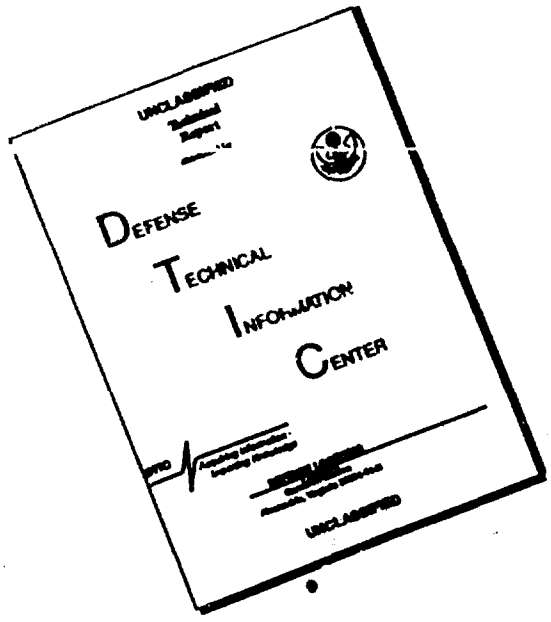

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UDC 631.521(252.6)

LET US CREATE VARIETIES FOR DRAINED PEAT BOGS

Selektsiya: Semenovodstvo
(Breeding and Seed Growing),
1967, No 2, pp 19-22

N. I. Fomitskiy
Candidate of Agricultural
Sciences, Belorussian
Scientific-Technical Institute
of Land Reclamation and
Water Economy

In essence the agricultural utilization of peat soils was begun after the Great October Socialist Revolution. During the current five-year period a new first step forward will be made in the reclamation of the lands of the non-chernozem zone, in particular in the draining of swamps and marshy lands. Thus, while by 1966 the area of drained lands in the Belorussian SSR reached 1.1 million hectares, during 1966--1970 it is planned to drain another 1.5--1.6 million hectares. Consequently, in 1970 the area of such lands in the Republic will amount to 2.6--2.7 million hectares. This is a huge source of increase in grain production and in other plant-growing produce.

It will be recalled that drained peat bogs have a high potential fertility; their main wealth is nitrogen. However, these soils contain little potassium, phorphorus or certain trace elements, especially copper. Without applying the macro- and microfertilizers lacking in the peat soils, it is impossible to count on a good yield.

In particular, with an insufficiency of copper most important grain crops such as winter and spring wheat, spring barley and some oat varieties hardly develop any grain. And conversely, observance of the elementary agricultural-technique methods, including the application of the necessary fertilizers, assures yields on such soils that are 1.5--2 times higher than those on the sod-podzolic soils. In addition to this, the yields of the grain crops on the peat soils are more stable and are less dependent on weather conditions.

The year 1965 was characteristic in this respect. In that year, in most of the regions of the Belorussian SSR, the amount of precipitation for April, June, and July did not reach even one third of the norm and the average diurnal air temperature considerably exceeded the perennial indices. At that time, the grain crops produced a poor yield on the usual soils. But on peat soils in competitive variety testing at the sovkhoz "Volma" in the Minskiy Rayon, the new prospective varieties developed by our Institute produced the following yields: winter wheat, Eritrospermum 354 -- 42 centners from one hectare; spring wheat, Bolotnaya L-47 -- 53.5 centners from one hectare; the oats, Minskiy 17 -- 54 centners; spring barley, Bolotnyy 458 -- 51.8 centners; at the Minsk Experimental Bog Station a yield of spring wheat, Lyutestsens 154, of 55.4 centners from one hectare was secured, that of the oats, Mutika 116 -- 54.4 centners, that of the spring barley, Parallelyum 534 -- 47.2 centners.

A large yield was also secured under full-scale production conditions. At the sovkhoz "10 let [years] in the BSSR," an average of 26 centners of grain of spring barley, Bolotnyy 458, was harvested from each one of the 534 hectares on the peat soils. On the separate plots where the recommended rates of mineral fertilizers had been applied, 40 centners were harvested.

At the present time, during which the areas of drained peat bogs will be rapidly increasing, the breeders are faced with the task of breeding new varieties of grain crops specially for cultivation on peat soils.

As is known, the usual varieties as a rule lodge on such soils. The chief reason is an excessive nitrogen supply for the plants which contributes to a vigorous development of the vegetative mass. In its turn, this leads to a shading of the stems. Developing under the conditions of insufficient light, they become elongated, lose their strength and are unable to withstand the pressure of the wind and rain. As a result there are great difficulties in harvesting, considerable crop losses (not infrequently 40--50%), and a high cost of the produce. Consequently, the first and perhaps the main task of breeding is to produce varieties that are resistant in the highest degree to lodging on peat soils.

It is also necessary to bear in mind that on such soils the vegetation period lengthens by 1.5--3 weeks in the separate varieties and samples (especially in the years with a low average diurnal temperature). Finally, conditions with increased moisture and temperature are created on the peat soils, which contribute to the development of diseases and pests.

All this has to be taken into account in the work on the creation of new varieties of the grain crops for cultivation on peat soils. Taking into consideration that picking out initial material for breeding determines in many respects the success of the undertaking, we started to study in 1949 the collection samples of grain crops.

For this purpose we obtained from the All-Union Institute of Plant Growing more than 800 domestic and foreign collection samples of spring wheat. As a result of their study the following samples of spring wheat proved to be relatively resistant to lodging: K-38429, K-38327, K-40589, K-41923, K-43192, K-44019, K-44024 (German Democratic Republic); K-34947, K-42686, K-43189, K-42682, K-42686, K-42695 (Poland); K-6414, K-23842, K-30554, K-39544 (India); K-28316, K-40156, K-41961, K-41963, K-42925, K-33949, K-43224 (Finland); K-39342, K-40014, K-40016, K-40017, K-40095, K-40096 (Australia) and other samples.

The earliest maturing varieties of spring wheat on peat soils proved to be Tulun 14-N-68 -- from Eastern Siberia, and Nadezhda -- from Leningradskaya Oblast. In the group of the quickly ripening samples are K-1818 and K-31706 (Eastern Siberia); K-42130, K-42137, K-42191, K-42171, K-44087 (China); K-5507, K-24387, K-25713 (India).

From among the samples affected by powdery mildew, leaf rust and stripe rust, the following samples of spring wheat proved to be the hardiest: K-37966, K-37912, K-37913, K-37915, K-38125, K-41513 (Belorussian SSR); K-38429, K-40589, K-41954, K-41992, K-38327, K-38431, K-43190, K-44019 (German Democratic Republic); K-41725, K-42656, K-42922, K-42923 (Sweden); K-39342, K-40014, K-40016, K-40095 (Australia).

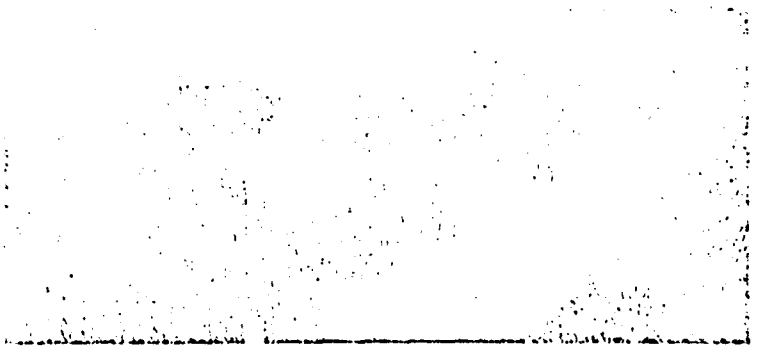
The hardiest resistance to diseases occurring at various times in different forms is characteristic of the samples K-37966, K-37912, K-37913, K-37915, K-38125 (Belorussian SSR); K-30765, K-30774 (Tatar and Bashkir ASSR), K-38429, K-38431, K-44019 (German Democratic Republic); and K-43577 (Norway).

The largest number of kernels in a spike are produced on peat soils by samples Tulun-14-N-68, K-1818, K-31706 (Eastern Siberia); K-43301, PPG 23021, Fil'giya (Central Chernozem Belt, USSR); K-37966, K-36548, K-36549, K-36550, K-37912, K-37915, K-37928, K-38124, K-37910, K-37993, K-38040, K-38057 (Belorussian SSR); K-28316, K-30175, K-41960, K-41961, K-41962, K-41963, K-42925 (Finland).

Belonging to the group with a very high weight of 1000 kernels are the samples K-37966, K-37912, K-37915, K-37928, K-38125, K-38068, K-41333 (Belorussian SSR); K-16111 (Primorskiy

Kray); K-38429, K-40755, K-41923, K-38431, K-43190, K-44019 (German Democratic Republic); K-39340, K-39342, K-40016, K-40017, K-40095, K-40096, K-40100, K-44024 (Australia); K-6414, K-23795, K-23862, K-25713, K-39539 (India).

The samples of spring wheat with the shortest stems were K-42130, K-42157, K-42171, K-44079, K-44080, K-44082, K-44087, K-44088 (China); K-5568, K-23805, K-23816, K-23862, K-25713 (India); K-39340, K-39342, K-40017 (Australia); K-38413, K-39608, K-39611, K-41342 (United States of America); K-43066, K-43067, K-8095, K-40058 (Canada); K-32781, K-41728, K-43140 (Argentina); K-41993, K-42656, K-42923 (Sweden). All of them are of a certain value in breeding for resistance to lodging.



Selection plantings of spring wheat on peat soils of the Minsk Experimental Bog Station.

A study was made of more than 400 samples of spring barley from 22 countries. From among the grain crops cultivated on peat soils, barley is most resistant to lodging and most productive. In barley samples with light resistance to lodging, it usually starts in the period of shooting and especially intensifies in the period of earing. The samples and varieties with moderate resistance to lodging lodge more often in the period of milky ripeness and shortly before harvesting.

For cultivation on peat soils, it is necessary to have barley varieties which have high resistance to lodging, which have short and strong straw, which are mid-season maturing and

early maturing, which have ears that do not droop and break during the ripening, which have medium and large kernels, which are resistant to diseases (especially to helminthosporiosis and fusariosis) and pests (frit fly), and which are highly responsive to fertilizers and improved agricultural techniques.

The largest number of samples showing little lodging proved to be in the Canadian group (K-18749, K-18664, K-18678, K-18683, K-18694, K-18720, K-18745). They have average and higher-than-average resistance to lodging, nearly all of them have immunity to fungus diseases and a high weight of 1000 kernels, they are comparatively quickly maturing, and have culm of average height.

Along with a high resistance to lodging and along with a good productivity, a portion of the samples in the Norwegian group (K-19009, K-19033, K-19065, K-19066, K-1824) has a high weight of 1000 seeds (from 40 to 55 grams), is slightly injured by the diseases and, owing to the complex of these characteristics, is a valuable initial material for breeding on peat soils.

The barley samples from the Yakut ASSR and northern regions of the European part of the USSR -- K-2129, K-4514, K-7970, K-7974, K-8674, K-10725, K-10747, K-15229, K-15619, K-9743, K-16423, K-9438, K-9448, K-9463 -- are characterized by comparative resistance to lodging and by a number of other positive characteristics.

Oats are able to yield 50 and more centners of grain on peat soils. But they also have a tendency to lodging. In most cases oats lodge at the later stages of development, after the heading of the panicles, and the lodging of the oats has more often the character of bottom lodging. It usually occurs in wet years and after torrential rains accompanied by strong winds. In some oat varieties the reason for lodging is the infection of the stem by bacterial rot.

A study of more than 300 oat samples from the collection of the All-Union Institute of Plant Growing from 20 odd countries was made on peat soils. However, no oat samples resistant to lodging and suitable for all weather conditions were found. The following samples have a relatively high resistance to lodging: K-9243, K-11130, K-11258 (German Democratic Republic); K-10942, K-10943, K-11241, K-11243 (Sweden); K-11262 (Czechoslovakia); K-11140, K-11145, K-11147 (France).

A slight vulnerability to fungus diseases was found in the oat samples K-11164, K-11165 (Norway); K-11261 (Czechoslovakia); K-11140, K-11141, K-11148, K-11150 (France); K-52041 (Spain); from among our homeland oats, those from the Baltic region stand

out in regard to the immunity to diseases. The following oat samples proved to be quickly ripening: K-9941, K-10926, K-11002 (Canada); K-8076, K-10028, K-11169, K-11170 (United States of America); K-11164 and K-11165 (Norway). The samples of the Danish (K-10982, K-10983), Belgian (K-10919), English (K-9885, K-10981) and Irish (K-10986) groups are characterized by comparatively short straw (from 90 to 110 cm).

Using the best samples from among those covered by the study for crossing and selection, the breeders at our Institute and of its experimental network have already created a number of potentially valuable forms, the best of which were the forerunners of the varieties adapted for cultivation on the drained peat bogs. From the spring wheat this is the variety Bolotnaya L-47 which is undergoing a State trial. It was bred by the method of individual selection from a sample of a spring wheat-quack grass hybrid secured from the Institute of Agriculture of the Central Regions of Non-Chernozem Zone and designated No 15478/47. Bolotnaya L-47 is more productive than the zonal variety Minskaya; it has a somewhat higher resistance to lodging and contains in the grain 17.1% of protein as against 15.2% in the variety Minskaya. The variety Lyutestsens 154 was bred by individual selection from the Swedish spring wheat sample secured from VIR [Vsesoyuznyy institut rasteniyevodstva; All-Union Institute of Plant Growing] and designated No 42656. In three years of competitive station variety testing, the average yield of this variety, 45.9 centners from one hectare, has been higher than the standard (the variety Minskaya) by 3.1 centners.

Barley variety Bolotnyy 458 was bred by the method of individual selection from the Swedish sample No 15961 secured from VIR. This variety is undergoing a State trial and is, at the same time, reproduced at the kolkhozes and sovkhozes of the Belorussian SSR. On the peat soils this variety is productive, quickly ripening, with an average resistance to lodging but has a comparatively small kernel. A new spring barley variety Parallelyum 534 has been prepared to be turned over for State trial. In the four-year station trial, this variety produced on the average a grain yield of 44.3 centners, exceeding the standard (the variety Polesskiy) by 3.2 centners and differing from the latter by a higher resistance to lodging and by early maturity. The variety Parallelyum 534 was bred by the method of individual selection from a Norwegian sample. The following two oat varieties were bred by the same method: Serebristyy -- from the German sample K-9261, and Minskiy 17 -- from the local sample of Vyborgskiy Rayon K-9731. The former was zoned in 1957 on the peat soils of Brestskaya and Grodnenskaya oblasts, and the latter in 1965 on the peat soils of L'vovskaya Oblast in the Ukrainian SSR.

This is only the beginning of extensive and very important work in the creation of highly productive varieties of grain crops for cultivation on drained peat bogs. This work is to be given wider scope, and breeders, working in different regions of the non-chernozem zone, should join in and carry it forward.